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IS 4500 (1967): Pipe Wrenches, Foot Print Type [PGD 5:
Assembly Hand Tools]

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(Reaffirmed 1982)

Indian Standard
SPECIFICATION FOR
PIPE WRENCHES, FOOT PRINT TYPE

(First Reprint DECEMBER 1983)

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INDIAN STANDARDS INSTITUTION
MANAK BHAVAN, 9 BAHADUR SHAH ZAFAR MARG
NEW DELHI 110002

Indian Standard

SPECIFICATION FOR PIPE WRENCHES, FOOT PRINT TYPE

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Indian Standard
**SPECIFICATION FOR
 PIPE WRENCHES, FOOT PRINT TYPE**

0. F O R E W O R D

0.1 This Indian Standard was adopted by the Indian Standards Institution on 8 December 1967, after the draft finalized by the Hand Tools Sectional Committee had been approved by the Mechanical Engineering Division Council.

0.2 Pipe wrenches, foot print type, are generally employed for rotating round work. These wrenches are quite simple and consist of a fixed jaw, a movable jaw and a pivot pin. The movable jaws are pivoted to permit a gripping action on the work.

0.3 While preparing this standard, assistance has been derived from the following:

CIGS/T&I/173 Wrenches, pipe 6 in. Ministry of Defence, Government of India.

IND/GS/669 (a) Wrenches, pipe. Ministry of Defence, Government of India.

0.4 For the purpose of deciding whether a particular requirement of this standard is complied with, the final value, observed or calculated, expressing the result of a test, shall be rounded off in accordance with IS : 2-1960*. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

1. SCOPE

1.1 This standard specifies the requirements for pipe wrenches, foot print type, for general engineering purposes.

2. NOMENCLATURE

2.1 For the purpose of this standard, the nomenclature as given in Fig. 1 shall apply.

*Rules for rounding off numerical values (*revised*).

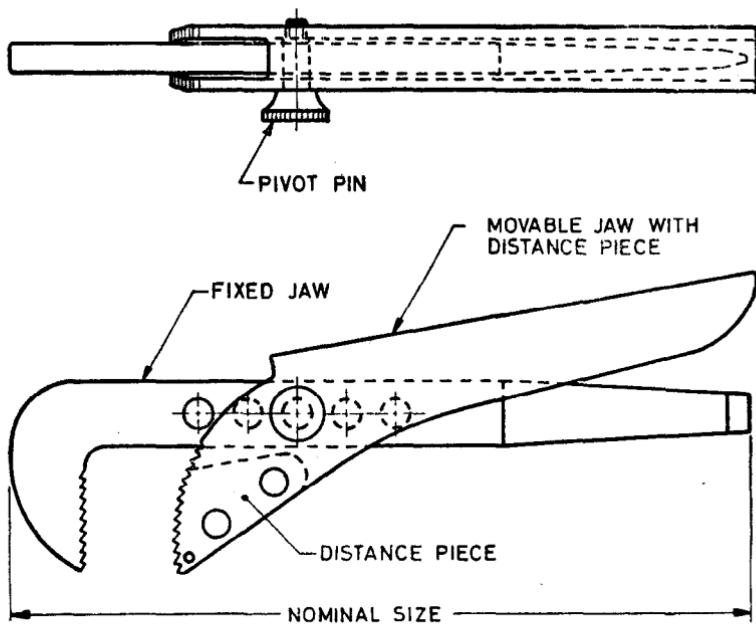


FIG. 1 NOMENCLATURE FOR PIPE WRENCH, FOOT PRINT TYPE

3. MATERIAL

3.1 The fixed jaw and the movable jaw shall be manufactured from steel conforming to C60 or C65 of schedule II of IS : 1570-1961*.

3.2 The pivot pin shall be manufactured from a carbon steel selected from IS : 1570-1961*.

4. HARDNESS

4.1 The jaws shall be hardened and tempered to have a hardness value within the range of 600 to 700 HV (*see* IS : 1501-1959†) when measured within the triangular profile of any tooth. At no point on the shank of the movable or the fixed jaw shall hardness value be in excess of 400 HV (*see* IS : 1501-1959†).

5. DIMENSIONS

5.1 The main dimensions for fixed jaw shall be as given in Table 1.

5.2 The main dimensions for movable jaw shall be as given in Table 2.

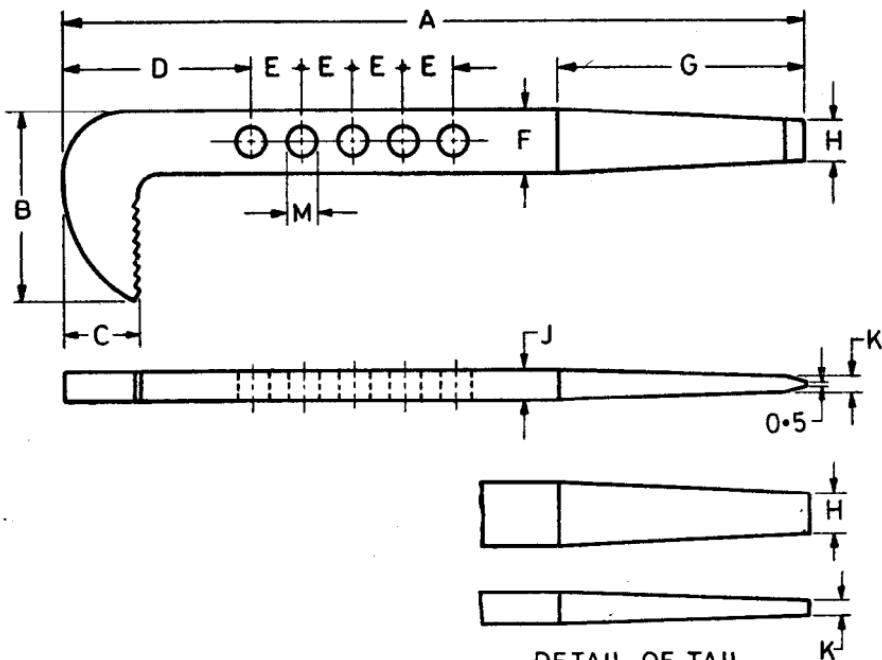
*Schedules for wrought steels for general engineering purposes.

†Method for Vickers hardness test for steel.

TABLE 1 DIMENSIONS FOR FIXED JAW

(Clause 5.1)

All dimensions in millimetres.



**DETAIL OF TAIL
FOR 400mm
WRENCHES**

NOMINAL SIZE	A	B	C	D*	E*	F	G*	H*	J	K*	M
150	150	38	15	38	10	13	50	8	6	3	6
225	225	55	20	55	15	20	50	10	10	3	7.5
400	400	108	38	108	18	38	210	20	13	10	12

*The values are approximate and for guidance only.

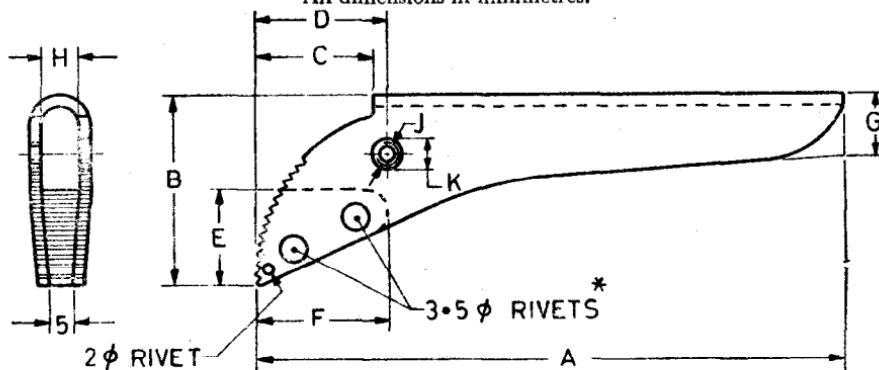
6. MANUFACTURE

6.1 The fixed jaw and the movable jaw shall be of one-piece forgings with integral teeth. The teeth shall be of definite number, shape and size to enable the assembled tool to meet the test requirements without slipping, and to grip positively during normal operation, any appropriate diameter pipe within the safe capacity. The crests of teeth shall be parallel and square related to the lateral axis of its shank. The fixed jaws of 150 mm nominal size wrenches shall be provided with four holes where as the fixed jaws of other sizes shall be provided with five holes.

TABLE 2 DIMENSIONS FOR MOVABLE JAW

(Clause 5.2)

All dimensions in millimetres.



NOMINAL SIZE	A ± 5	B ± 2	C†	D†	E†	F†	G†	H $\pm \frac{1}{6}$	J	K†
150	125	40	25	28	20	28	13	8	M5	6
225	190	65	35	38	30	38	20	12	M6	7.5
400	355	115	50	65	50	75	22	16	M10	12

*Wrenches of 400 mm nominal size shall be provided with three rivets.

†The values are approximate and for guidance only.

6.2 The top of the pivot pins shall be knurled or longitudinally serrated.

7. WORKMANSHIP AND FINISH

7.1 The wrenches shall be free from defects, such as flaws, cracks, burrs, or inferior surface treatment.

8. DESIGNATION

8.1 The pipe wrenches, foot print type, shall be designated by:

- a) Commonly used name,
- b) Nominal size, and
- c) Number of this standard.

Example:

A pipe wrench, foot print type, of nominal size 150 mm shall be designated as:

Pipe Wrench, 150 IS : 4500

9. MARKING

9.1 The wrenches shall be marked with the manufacturer's name, trade-mark and the nominal size.

9.1.1 The wrenches may also be marked with the ISI Certification Mark.

NOTE — The use of the ISI Certification Mark is governed by the provisions of the Indian Standards Institution (Certification Marks) Act, and the Rules and Regulations made thereunder. Presence of this mark on products covered by an Indian Standard conveys the assurance that they have been produced to comply with the requirements of that standard, under a well-defined system of inspection, testing and quality control during production. This system, which is devised and supervised by ISI and operated by the producer, has the further safeguard that the products as actually marketed are continuously checked by ISI for conformity to the standard. Details of conditions, under which a licence for the use of the ISI Certification Mark may be granted to manufacturers or processors, may be obtained from the Indian Standards Institution.

10. SAMPLING

10.1 Unless otherwise agreed to between the supplier and the purchaser the sampling plan as given in Appendix A shall be followed.

11. TESTS

11.1 Load Test — A cylindrical steel test bar shall be rigidly mounted in a test rig as illustrated diagrammatically in Fig. 2. The test bar shall be of diameter as given in Table 3 and shall have hardness within the range of 300 to 380 HV (*see IS : 1501-1959**) at any point on its circumferential surface.

The wrench shall be mounted in the rig with the teeth in normal working engagement with the test bar (*see Fig. 2*) and a load shall be applied sufficient to result in a proof torque at point P as given in Table 3. On the completion of test, there shall be no sign of permanent deformation or cracking of any portion of the wrench. Also, there shall be no sign of elongation of holes.

**TABLE 3 LOAD TEST REQUIREMENTS FOR PIPE WRENCHES,
FOOT PRINT TYPE**

NOMINAL SIZE mm	DIA OF TEST BAR mm	PROOF TORQUE kgf.m	LOAD POSITION, x mm
150	38	11.5	38
225	45	27.5	38
400	75	57.5	38

*Method for Vickers hardness test for steel.

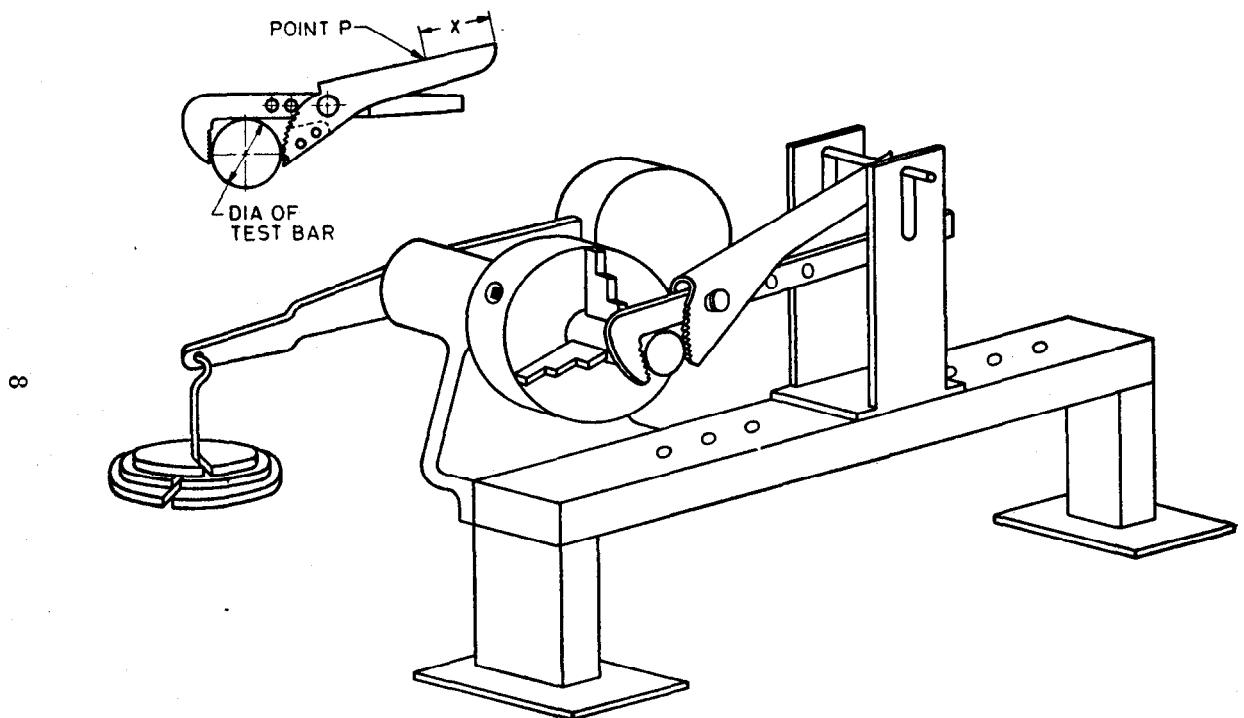


FIG. 2 DIAGRAMMATIC ARRANGEMENT OF TEST RIG

APPENDIX A

(Clause 10.1)

SAMPLING PLAN AND CRITERIA FOR CONFORMITY

A-1. SCALE OF SAMPLING

A-1.1 Lot — In any consignment all wrenches of the same size and manufactured from the same material under essentially similar conditions of manufacture shall be grouped together to constitute a lot.

A-1.2 In order to ensure the quality and reliability of the assembly it is necessary that all its components conform rigidly to the specified requirements. It is recommended that methods given in IS : 397-1952* be used to control the quality of the components during production. Adequate records of the testing and inspection carried out for process control may be maintained by the manufacturer which may be produced for the scrutiny of the purchaser. In case the purchaser is satisfied with process control, the scale of sampling as given in col 1 and 2 of Table 4 shall be followed to ascertain the conformity of the lot to the requirements of this standard. In case the purchaser is not satisfied with the records, or their non-availability, the scale of sampling as given in col 1 and 2 of Table 5 shall be followed.

**TABLE 4 SCALE OF SAMPLING AND PERMISSIBLE NUMBER
OF DEFECTIVES — METHOD 1**
(*Clauses A-1.2, A-1.3, A-2.1 and A-2.2*)

NO. OF WRENCHES IN THE LOT <i>N</i>	FOR DIMENSIONS, MANUFACTURE, AND WORKMANSHIP AND FINISH		FOR HARDNESS AND LOAD TEST SAMPLE SIZE
	Sample Size <i>n</i>	Permissible No. of Defectives	
(1)	(2)	(3)	(4)
Up to 15	2	0	2
16 „ 25	3	0	2
26 „ 100	5	0	3
101 „ 150	8	1	5
151 „ 300	13	1	8
301 „ 500	20	2	8
501 „ 1 000	32	3	13
1 001 and above	50	5	13

*Method of statistical quality control during production by the use of control chart (*tentative*).

TABLE 5 SCALE OF SAMPLING AND PERMISSIBLE NUMBER OF DEFECTIVES — METHOD 2

(Clauses A-1.2, A-1.3, A-2.1 and A-2.2)

NO. OF WRENCHES IN THE LOT <i>N</i>	FOR DIMENSIONS, MANUFACTURE AND WORKMANSHIP AND FINISH		FOR HARDNESS AND LOAD TEST SAMPLE SIZE
	Sample Size <i>n</i>	Permissible No. of Defectives	
(1)	(2)	(3)	(4)
Up to 8	2	0	2
9 „ 15	3	0	2
16 „ 25	5	0	3
26 „ 50	8	1	5
51 „ 100	13	1	5
101 „ 150	20	2	8
151 „ 300	32	3	13
301 „ 500	50	5	13
501 „ 1 000	80	7	20
1 001 and above	125	10	32

A-1.3 The wrenches shall be selected at random and in order to ensure the randomness of selection, one of the following procedures is recommended:

- a) If all the items in a lot are packed in one box, then starting from any item count them in one order as 1, 2, 3, ..., etc up to r and so on, where r is the integral part of N/n (N being the number of items in the lot and n being the number of items to be selected). Every r th item thus counted shall be withdrawn to constitute the sample.
- b) If the items are packed in more than one box, approximately an equal number of items shall be picked up randomly from as many boxes as possible so as to obtain the required number of items, as specified in col 2 of Table 4 or 5.

A-2. NUMBER OF TESTS AND CRITERIA FOR CONFORMITY

A-2.1 The wrenches selected according to A-1.3 shall be examined for dimensions (see 5), manufacture (see 6), and workmanship and finish (see 7). If the number of items failing to meet the requirements of any one or more of the characteristics, is less than or equal to the permissible number of defectives given in col 3 of Table 4 or Table 5, the lot shall be declared as conforming to the requirements of these characteristics.

A-2.2 In the case of those lots which have been found satisfactory according to **A-2.1**, a number of wrenches equivalent to the sample size indicated in col 4 of Table 4 or Table 5, shall be chosen from those already selected according to **A-1.3**. These shall be subjected to hardness (*see 4*), and load test (*see 11.1*). Any wrench failing in one or more of the tests given in **4** and **11.1** shall be considered to be defective.

A-2.2.1 If no wrench is found to be defective, subjected to the various tests (*see A-2.2*), the lot shall be declared as conforming to the requirements of the specification otherwise not.

INTERNATIONAL SYSTEM OF UNITS (SI UNITS)

Base Units

QUANTITY	UNIT	SYMBOL
Length	metre	m
Mass	kilogram	kg
Time	second	s
Electric current	ampere	A
Thermodynamic temperature	kelvin	K
Luminous intensity	candela	cd
Amount of substance	mole	mol

Supplementary Units

QUANTITY	UNIT	SYMBOL
Plane angle	radian	rad
Solid angle	steradian	sr

Derived Units

QUANTITY	UNIT	SYMBOL	DEFINITION
Force	newton	N	1 N = 1 kg.m/s ²
Energy	joule	J	1 J = 1 N.m
Power	watt	W	1 W = 1 J/s
Flux	weber	Wb	1 Wb = 1 V.s
Flux density	tesla	T	1 T = 1 Wb/m ²
Frequency	hertz	Hz	1 Hz = 1 c/s (s ⁻¹)
Electric conductance	siemens	S	1 S = 1 A/V
Electromotive-force	volt	V	1 V = 1 W/A
Pressure, stress	pascal	Pa	1 Pa = 1 N/m ²

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